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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MILLER, MICHAEL G

ART UNIT

PAPER NUMBER

1792

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/815,526	Applicant(s) BACOS ET AL.	
	Examiner MICHAEL G. MILLER	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-11 and 13-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-11 and 13-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 OCT 2008 has been entered.

Response to Amendment

2. As a result of the amendment filed 14 OCT 2008:
- a. Claims 1, 4, 14 and 24 are amended.
 - b. Claims 1, 3-11 and 13-25 are pending examination.
 - c. Claims 2 and 12 are canceled.

Response to Arguments

3. Examiner withdraws the rejection made under 35 U.S.C. 112, second paragraph, as the amendment to the claims has corrected the grounds on which the rejection was based.
4. Applicant's arguments filed 14 OCT 2008 with regards to the rejections made under 35 U.S.C. 103(a) have been fully considered but they are not persuasive.

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5. Applicant's first argument is that the zirconium in the prior art is deposited with oxide bonds and is not pure zirconium, and therefore is not zirconium metal as required by the amended claims. Examiner notes that in the Darolia reference, the pack aluminiding process is being performed with the intent to deposit zirconium. Darolia teaches zirconium chloride as a suitable zirconium source; Andolfatto teaches that zirconium chloride and zirconium oxychloride are used to obtain zirconium for deposition purposes. Andolfatto is reacting the zirconium source with an oxygen source to obtain zirconium oxide; however, if the zirconium source is heated without an oxygen source, the zirconyl chloride will decompose to produce zirconium metal. The teaching of Darolia teaches heating the zirconium source in the absence of an oxygen source as discussed in the previous rejection of Claim 1. Therefore, a person having ordinary skill in the art at the time the invention was made would have a reasonable expectation of success if they used the zirconium oxychloride compound of Andolfatto, a known zirconium source, in the deposition method of Darolia and as such would be motivated to make the combination of teachings..

6. Applicant's second argument is that Darolia does not provide motivation for modification of the method to use a single gaseous compound which is both activator and modifying element. Examiner respectfully points out that the claim language does not require that the active gas contain an activator halide; as such, the argument is moot.

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7. Applicant's third argument is that Andolfatto uses zirconium oxychloride as a precursor of zirconium oxide, not zirconium. This is addressed in the same vein as applicant's first argument.

8. Applicant's fourth argument is that the protection is based on a specific process. Examiner notes that Claim 9 is not a product-by-process claim and therefore as long as the product meets the specifications of the claim, the process is irrelevant. Darolia and Andolfatto meet said specifications as discussed above.

9. Examiner maintains all grounds of rejection presented in the previous Office Action.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1, 3-11, 13, and 15-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Darolia in view of Andolfatto et al.

14. Regarding Claims 1 and 24, Darolia teaches a method/process for forming a protective coating containing aluminium on a surface of a metal substrate (see Column 7, lines 1 - 5, and Column 3, lines 51 and 52), the method comprising: placing the metal substrate and a non-gaseous precursor containing aluminium in contact, at a treatment temperature sufficient for stoichiometric coating, with an atmosphere containing an active gas (see generally Column 7, lines 1 - 54, and Figure 4); reacting the atmosphere containing the active gas with the non-gaseous precursor containing aluminium to form a gaseous aluminium compound (see Column 7, lines 33 - 36); decomposing the gaseous aluminium compound on contact with the metal substrate and depositing aluminium metal on the metal substrate, wherein the atmosphere further comprises a gaseous compound of a modifier metal (see Column 7, lines 36 - 45); and decomposing the gaseous compound of the modifier metal on contact with the metal substrate and

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simultaneously depositing the modifier metal on the metal substrate with the depositing of the aluminium metal (see again Column 7, lines 33 - 45). Darolia does not teach that the gaseous compound of the modifier metal is zirconium oxychloride, but does disclose zirconium chloride at Column 7, lines 19 - 21, and lines 33 - 36. Andolfatto et al teaches application of zirconium to metallic surfaces and further teaches that zirconium chloride and zirconium oxychloride (zirconyl chloride) are both usable and preferred for applying zirconium to a metal surface. Further, the zirconyl chloride can be applied by CVD, meaning that it can be delivered as a gas (Column 3 Lines 3-12, 17-21 and 37-59). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have combined the method of Darolia with the chemical of Andolfatto because Darolia wants to apply zirconium into an aluminide surface using zirconium chloride and Andolfatto teaches that zirconium chloride and zirconium oxychloride are both suitable for the purpose. Zirconium and aluminum are deposited simultaneously as discussed above.

15. Regarding Claims 3 and 4, Darolia teaches the process in which the said active gas at least in part comprises the gaseous compound (see Column 7, lines 33 - 36).

16. Regarding Claims 5 and 25, Darolia does not explicitly teach the process/method in which the said active gas solely comprises or consists of the gaseous compound of the modifier metal. However, as discussed, Darolia teaches, in Column 7, lines 33 - 36, that "... the halide gas containing the modifying elements contact[s] the aluminum-containing material and the source of the modifying element to form the corresponding halide gas." That is, Darolia is implicitly teaching that the halide gas containing the

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modifying elements can react with the aluminium-containing precursor in an equilibrium reaction to form an aluminium halide gas. Moreover, Andolfatto teaches the use of zirconium oxychloride as discussed above which is a halide that contains the modifying element and is a gas at the temperatures at which the claimed process operates, as disclosed by Applicants, and that other metal halides are capable of being halide activators (Column 7, lines 9- 10). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Darolia by using an active gas comprising a single gaseous compound that is both an activator halide and a source of the modifying element in the process disclosed by Darolia with a reasonable expectation of success, because Darolia teaches both that a halide active gas containing the modifying metal element reacts with the aluminium-containing precursor and that the source of the modifying element is preferably is a halide compound of the modifying metal as taught by Andolfatto (e.g., zirconium oxychloride).

17. Regarding Claim 6, Darolia teaches the process according to Claim 3, in which the active gas also contains at least one ammonium compound (see Column 7, lines 9 - 10, "... and a halide activator, preferably ... ammonium fluoride").

18. Regarding Claim 7, Darolia teaches the process in which the active gas and/or the gaseous compound are formed by the vaporization of at least one substance which is solid at ambient temperature mixed with the said precursor (see Column 7, lines 7 - 36). Andolfatto teaches that the precursor of the modifying element is preferably

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zirconium oxychloride as discussed above. Zirconium oxychloride is disclosed as solid at ambient temperatures by Andolfatto (Column 3 Lines 3-12).

19. Regarding Claim 8, Darolia teaches the process in which the substrate contains at least one element which combines with the aluminium to form an intermetallic compound within the coating in which the aluminium is partly substituted by the modifier metal (see Column 4, lines 23 - 41, and specifically "The remainder of the diffusion aluminide internal protective layer, which is not aluminum and not the modifying element, is elements that are interdiffused into the diffusion aluminide internal protective layer from the substrate, primarily nickel," at lines 32 - 36.)

20. Regarding Claim 9, Darolia teaches the process according to Claim 8, in which the element of the substrate is nickel (see Column 3, lines 28 - 30) and the intermetallic compound is beta-NiAl. Applicants disclose that "the coating obtained essentially comprises the beta-NiAl phase, which has a simple cubic structure. This phase has a wide range of non-stoichiometry from NiAl(÷) (57% by atoms) to NiAl(-) (37% by atoms)." Darolia teaches, in Column 4, lines 23 - 25, that "... the average aluminum content of the diffusion aluminide ... layer is from about 16 to about 30 percent by weight." Because about 16 to about 30 percent by weight Aluminium corresponds to about 29 to about 48 percent by moles or by atoms in an essentially binary Nickel-Aluminium mixture, and because the process taught by Darolia is essentially the same as the process disclosed by Applicants, much of the nickel aluminide layers formed in the process taught by Darolia, from 37% to 48% Aluminium by atoms, would necessarily be beta-NiAl as defined by Applicants, and thus all the limitations of the claim are met.

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21. Regarding Claim 10, Darolia teaches the process in which the substrate is a nickel-based superalloy (see Column 3, lines 28 - 30).
22. Regarding Claim 11, Darolia teaches the process in which the said active gas and/or the gaseous compound contain at least one halogen (see Column 7, lines 19 - 21, and lines 33 - 36).
23. Regarding Claim 13, Darolia teaches the process according to Claim 11, in which the active gas contains ammonium fluoride (see Column 7, lines 9 - 10).
24. Regarding Claim 14, Darolia teaches the process according to Claim 1, in which the active gas contains ammonium fluoride (see Column 7, lines 9 - 10).
25. Regarding Claim 15, Darolia teaches the process in which the said precursor is an alloy of aluminium and chromium (see Column 7, lines 6 - 8, and lines 15 - 17).
26. Regarding Claims 16 and 17, Darolia teaches the process in which the substrate and the precursor are at a distance from each other, and in which the substrate is located above the precursor (see Column 6, lines 41 - 58, and Figure 4).
27. Regarding Claim 18, Darolia teaches the process in which the substrate and the precursor are in contact (Darolia teaches, in Column 7, lines 55 - 60, that "other operable approaches for introducing the source of aluminum into the internal passages may also be used. Examples include ... pack cementation, and above-the-pack aluminiding." Pack cementation is a term well-known in the art of aluminide coatings that refers to a process in which the substrate and a non-gaseous precursor containing aluminum are placed in contact and then heated).

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28. Regarding Claim 19, Darolia teaches the process in which the substrate and the precursor are located in an enclosure permitting only limited exchange with the exterior (see Column 7, lines 6 - 12, and Column 6, lines 41 - 58).

29. Regarding Claim 20, Darolia teaches the process according to Claim 1, in which in addition to the active gas and the gaseous compound the said atmosphere comprises an inert or reducing gas and preferably hydrogen (see Column 7, lines 36 - 40).

30. Regarding Claim 21, Darolia teaches the process in which the modifier element is present in the said protective coating in a concentration by mass of less than 0.5% (see Column 3, lines 64 - 67 and Column 4, line 1, where it states that "The modifying element is hafnium, yttrium, zirconium ... The modifying element is present ... in an amount of from about 0.1 to about 5.0 weight percent of the diffusion aluminide internal protective layer.")

31. Regarding Claim 22, Darolia/Andolfatto does not explicitly teach the process according to Claim 21 in which the said concentration by mass lies at or above 500 ppm and below 1000 ppm. However, as discussed for Claim 21, Darolia does teach, in Column 3, lines 65 - 67, and Column 4, line 1, that "the modifying element is present, on average, in an amount of from about 0.1 to about 5.0 weight percent of the diffusion aluminide internal protective layer." It has been held that, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art", a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Circ. 1990). See MPEP 2144.05 I. Therefore, it would have been obvious to one having ordinary skill in the art at the time

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of the present invention to have modified the method taught by Darolia by forming a protective coating in which the modifier metal is present in a concentration by mass of less than 0.1% or 1000 ppm, because Darolia teaches the process for forming protective coatings in which the modifier metal is present in amounts of about 1000 ppm and because it has been held that in the case where the claimed range overlaps a range disclosed by the prior art a prima facie case of obviousness exists.

32. Regarding Claim 23, Darolia/Andolfatto teaches a temperature range encompassing 1080 degrees Celsius (Darolia Column 7 Lines 40-55).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL G. MILLER whose telephone number is (571)270-1861. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael G. Miller/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792